

Cleft Lip and Palate- the Role of Pedodontist in Rehabilitation

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Abstract

Orofacial clefts—including cleft lip (CL), cleft lip and palate (CLP), and cleft palate (CP) alone, are among the most common congenital anomalies. CLP are immediately recognizable disruption of normal facial structure accounting approximately one in 600 new born babies and over 300 syndromes are known to have cleft of the lip or palate as an associated feature. There has been a robust growth in the treatment of cleft lip and palate and has come a long way before the total rehabilitation by multi disciplinary approach has helped the cleft patient lead a normal life with almost a face as normal as any other individual. The credentials go to the excellent surgical skills that are intricate with seamless multidisciplinary teamwork by various specialists. However, Pedodontists role in the multidisciplinary team approach has been very faint in spite of the fact that he is the right specialist being trained in every aspect of anatomy, physiology and psychology of a child who is not just a miniature adult. Any wrong handling of patient even with slightest breach of psychological handling a cognitively immature can leave the child permanently handicapped as far as dental fear and anxiety are concerned so he is the right person who can handle a child better. Hence, their active role in

early intervention in overall management is highly recommended. The purpose of this paper is to provide an insight on role of Pedodontist in comprehensive management of CLP patient from birth to adolescence.

Keywords: Cleft Lip and Cleft Palate, Role of Pedodontist, Dental Management of Cleft Lip and Palate Patient.

Introduction

Orofacial clefts—including cleft lip (CL), cleft lip and palate (CLP), and cleft palate (CP) alone, are among the most common congenital anomalies. CLP are immediately recognizable disruption of normal facial structure accounting approximately one in 600 new born babies and over 300 syndromes are known to have cleft of the lip or palate as an associated feature. It causes considerable morbidity, impose a substantial financial risk for family with a concomitant societal burden. These patients may experience problem with feeding, speaking, hearing, and social integration.

The treatment protocol of a CLP patient is unique and needs a smooth delivery of optimum expertise of various specialties in an intricate seamless way, because treatment delivered by one specialty may hamper or interfere in the treatment of another. ^[1] Team approach to patients with

craniofacial anomalies which includes coordination with oral and maxillofacial surgeons, ENT specialists, obstetricians, speech pathologist, pediatricians, psychologist, ophthalmologist and the nursing staff. Pedodontists role in the multidisciplinary team approach is very important as a specialist being trained in every aspect of child from physiology to psychology their active role in early intervention in overall management is highly recommended. The purpose of this paper is to provide an insight on role of Pedodontist in comprehensive management of CLP patient from birth to adolescence.

The pediatric dentist's involvement in the rehabilitation will be so confluent that it's difficult to say when he should intervene and when to stop so that he becomes an inseparable and continuing care giver to the child. The various problems seen in a child with CLP starts with the difficulty in feeding, oro-nasal communication, crowding, supernumerary teeth, cleft of lip and palate, protruded premaxilla, hearing difficulties, speech problems, Transverse maxillary deficiency with crossbite, Midfacial retrusion, Reduced antero-posterior development, Mandibular prognathism, concave soft tissue profile, collapsed arch, Congenitally missing teeth, Neonatal teeth, Ectopic eruption, Anomalies of tooth size and shape, Micro- and macrodontia, Fused teeth, Enamel hypoplasia, Deep bite, Crowding or spacing of teeth. etc.

The most broadcast treatment modalities in the management of cleft lip and palate are:

- Diagnostic examination.
- Parental counselling and feeding advices.
- Age 3 months - Repair of Cleft Lip
- Age 6 months - Presurgical orthopaedics:- NAM, Obturator, Non-surgical columella lengthening, lantham appliance, pre-maxillary retraction, gingivo-perioplasty. If necessary; first speech evaluation.
- Age 9 months - Speech therapy begins

- Age 9-12 months - Repair of Cleft Palate
- Age 1-7 years - Orthodontic treatment
- Age 7-8 years - Alveolar bone graft
- Older than 8 years - Orthodontic treatment continues and Orthognathic surgery for maxillary advancement

Antenatal Diagnosis

Pedodontists can become involved in diagnosing the cleft at an early stage along with the gynecologists when the baby is just 2 months old prenatally. Improvements in ultrasound scanning have resulted in antenatal diagnosis of clefts becoming more common. As soon as possible after diagnosis the referral should be made to the regional CLP team. Antenatal ultrasound is accurate but with questionable sensitivity. [2] Prenatal diagnosis gives parents time to prepare emotionally for the birth and become knowledgeable about the birth defect.

Maternal Counselling

Soon after the diagnosis, counselling of parents for adequate care once the baby is born, can be given by pedodontists along the other specialists as the parents would be confused at this stage and would not know whom to visit. The pedodontists can also contact the cleft team and supervise the situation guiding the parents in the right path. Counselling reveal the parents the chances of cleft seen in the baby, the related abnormalities which will be present and also the difficulties to be faced in each stages of child development to both child and parents.

After the birth of an infant with CLP, parents are usually shocked at the first sight of their child's face. The family's situation is classified as a 'psychosocial emergency, characterized by disappointment, helplessness and desperation, which may lead to a period of severe emotional crisis for the parents. Often the parents feel guilty about the malformation and are concerned about the future of their child. In this scenario, maternal counselling in a cleft center is of significant importance for providing

extra support and encouragement during this vulnerable period.

Feeding

Pedodontists can guide the parents in feeding the child by educating about the difficulties faced and provide better options through appliances which can help feeding. Young [3] noted that for 95% of parents issues around feeding because of abnormal oro-nasal communication in the child, was the main concern. These infants often have difficulty closing their mouth around the nipple of the mother or the bottle to make a seal. [4,5] The feeding appliance helps to cover palate.

Feeding Advice

Pedodontists can advise on feeding, like positions for feeding, use of palatal plate to provide oro-nasal differentiation, different methods of feeding etc.

Feeding problems in CLP patients like insufficiency in suckling is mainly due to inability in creating negative pressure, excessive air intake, choking, nasal discharge, regurgitation. All these together with excessive time required for nourishment make it difficult for the infant to maintain adequate nutrition. [6] Specially designed bottle systems, nipples and flow valves aid in the comfort and effectiveness of feeding. [7]

Mead Johnson bottle: a compressible bottle with an elongated cross cut nipple. By gently squeezing the bottle the milk flows.

Haberman Feeder bottle: with a disc with holes facing the bottle and a smooth side facing the nipple. When the nipple is rotated, the holes are open and milk flows into the baby's mouth.



Figure 1: various types of special feeders for children

Dr. Brown's bottle: comes with a level 1 nipple which can be replaced with a level 2 nipple to provide faster milk flow.

Enfamil Cleft Plate Nurser with narrow cross cut nipple & pigeon cleft palate nipple.

Considerations during Feeding

Child should be kept in an upright position & made to burp regularly. [8] Infants with CP tend to swallow a lot of air during feeding even in an upright position, hence the feeding time should be restricted to 30 min for 2–3 ounces (60–85 ml). [9]

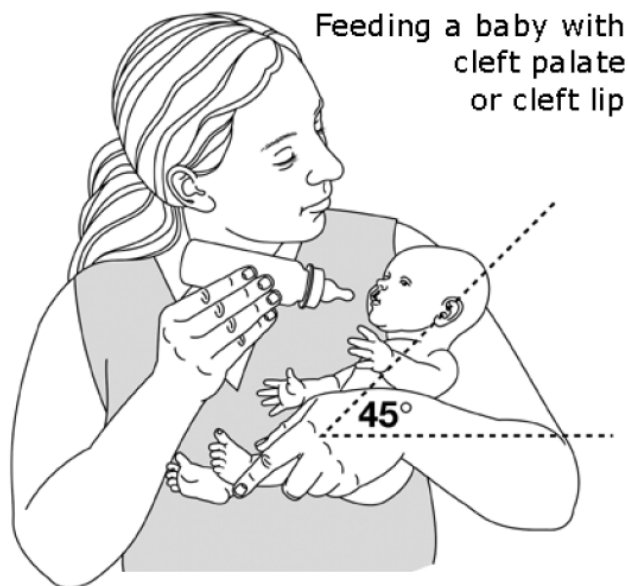


Figure 2: Feeding positions



Figure 3: Feeding by nasogastric feeder

Cleft Lip Repair

Repair of cleft lip or surgery can be performed at this stage within the age of 3 months.

Feeding Obturator

Pedodontists can fabricate and deliver feeding obturators which are prosthetic aids designed to obturate the cleft ensuring separation between oral and nasal cavities and hence reducing nasal regurgitation and helping in the development of jaws and speech. The obturator act as a rigid platform preventing the encroachment of tongue to the defect thus facilitating spontaneous growth of the palatal shelves.

Impression Methods¹

1) light-polymerizing acrylic resin sheets which are moldable is used to form the primary impression tray for preliminary impression and a custom made tray is fabricated. Final impression can be recorded with Vinyl polysiloxane materials; the baby is held face toward the floor, in order to prevent aspiration in the event of vomiting and asphyxia.

2) Primary impression can be made by softened green stick compound and for wash impression putty consistency addition silicone impression material is used. Most often used in patients with restricted mouth opening.

3) A wax sheet of approximate size adapted intraorally. A stone model of the negative wax reproduction is then obtained and a custom acrylic tray with a handle is prepared to be used for final impression.

After the obturator has been fitted, care should be taken. After each feed, the plate should be removed and cleaned with running water and soaked once a day in chlorhexidine solution for 20 min.^[10]

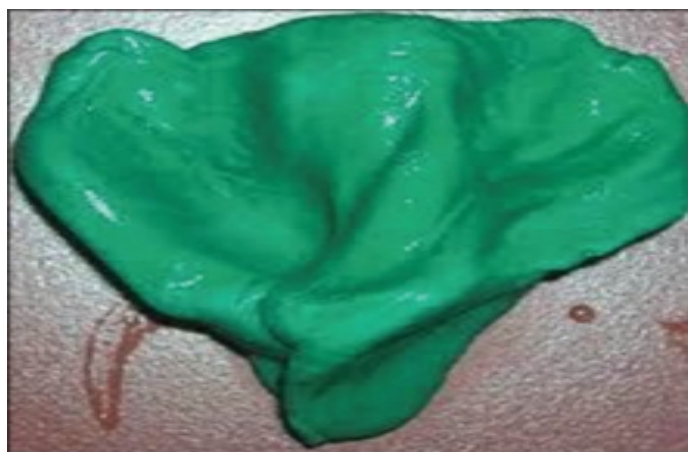


Figure 4: Impression recorded using silicone putty material



Figure 5: model cast poured

Pre-Maxillary Orthopaedics

Orthopaedic intervention can be initiated within the first week of life and is aimed at normalizing function and arch form. The modern school of pre surgical orthopaedic treatment in CLP was started by Mc Neil in 1950.^[9]

Burston further developed Mc Neil's technique and made it popular.^[1,11]

Naso Alveolar Moulding (NAM)

Pedodontists can intervene and fabricate NAM appliance to reshape the alveolar and nasal segments prior to surgical repair and improve the surgical outcome of the primary surgical repair. Evaluation of the infant for NAM is started soon after birth. Introduced by Grayson *et al.* (1999), the primary aim of NAM is reduction in the soft tissue and cartilaginous deformity to facilitate surgical soft tissue repair in optimal conditions under minimum tension to minimize scar formation, done by molding tissues during the first 6 months of age because of raised level of hyaluronic acid under the influence of circulating maternal estrogen in neonates.^[12]



Figure 6: Nasoalveolar moulding appliance

Impression

Primary impression is made with heavy-bodied silicone impression material. Grayson and Maull^[12] held infant upside down position to keep the tongue forward which permitted fluids to draw off the oral cavity and impression tray is placed. Yang *et al.*^[13] took the impression using a pre-trimmed customized pediatric tray with the baby mainly in the erect position. Prashanth *et al.*; Mishra *et al.* obtained impression when the infant was awake in a prone position on the dental chair. Dubey *et al.* made impression

using ice cream stick and impression compound.^[14]

Appliance Fabrication

All the undercuts and the cleft space are blocked and 2–3 mm thick plate made up of clear self-cure acrylic to provide structural integrity. The borders must be relieved. A retention button is fabricated and positioned at the junction of the upper and lower lip at an angle of 40°. The orthodontic elastics and tapes attached to retention button for retention.^[15] A small vent is provided measuring 6–8 mm in diameter on the palatal surface of plate. The nasal stent construction is delayed until the cleft of the alveolus is reduced to about 5–6 mm in width. The use of skin barrier tapes on the cheeks like duoderm or Tegaderm is advocated to reduce irritation on the cheeks. The elastics should be stretched approximately two times their resting diameter for proper activation force. Additional tapes may be necessary to secure the horizontal tape to the cheeks.



Figure 7: Obturator

Nasal Stent

The nasal stent component is incorporated once the width of the alveolar gap is reduced to about 5 mm. The rationale for delaying the addition of the nasal stent is that as the alveolar gap is reduced, the base of the nose and the lip segment alignment is also improved.



Figure 8: acrylic bulb prosthesis

Modifications of NAM

Muscle-activated maxillary orthopedic appliance,^[16] alveolar molding appliance with expansion screw,^[17] dynamic presurgical nasal remodeling intraoral appliance^[18] extra-oral nasal molding appliance^[19] and self-retentive appliance with orthodontic wire^[20] in presurgical infant orthopedics.

Complications

- Irritation to oral mucosal or gingival tissue
- Intraoral tissues ulceration from pressure or rubbing
- Notching along the alar rim, if the lower lobe is not positioned or shaped correctly
- The tapes should be removed slowly and carefully to avoid skin irritation. Tape removal solvents or warm water/ aloe vera gel can facilitate the removal of tapes.
- Risk of molding plate dislodgement and airway obstruction.
- Taping the arms too horizontally or with inadequate activation increases the possibility that the posterior border of the molding plate will drop down onto the tongue.

Pre Maxillary Retraction

In cases of CLP, pre-maxillary segment may be positioned severely anterior to the maxillary arch or deviated laterally to one side where a straight extra oral force would not place the pre maxilla in the facial midline. In this case, external acrylic "bulb" prosthesis is constructed and anchored to the infant's head with a bonnet appliance. After the premaxilla comes to midline, the bulb appliance is replaced by a single elastic strap. In mild cases, the use of soft, elastic tape (Microfoam Tape) worn for 24 hours a day can retract the premaxillary segment within 6 to 8 weeks.

Latham Appliance (Georgiade in 1970) is anchored on the non-cleft maxillary segment that would exert forward force on the cleft maxilla and provide some control over the non-cleft segment.

Oral Rehabilitation

These children mainly present with deformed face, inability to feed, and nasal regurgitation of fluids. Hearing defects are common due to disorder of the middle ear as well as Speech problems like nasal twang in the voice and difficulty in articulation.

Dental problems include: Congenitally missing teeth, Neonatal teeth, Ectopic eruption, Supernumerary teeth, Anomalies of tooth size and shape, Micro- and macrodontia, Fused teeth, Enamel hypoplasia, Deep bite, Crossbite, Crowding or spacing of teeth.

Understanding Child Psychology and Behaviour Management

Patients with CP have lowered self esteem and facing difficulties in social interaction. Parents of children with clefts are more likely to spoil their child by being over protective. The fast developing changes in the aspect of psychology and intelligence points towards a better and suitable world of pediatric practice. Knowing the psychology of child helps manage them through following

the cognitive development and clinically apply these features in behavior modification, by which treating a child patient becomes a success. Behaviour management is one of the corner stone's of the pedodontics specialty by which every Pedodontist is well versed with the different aspects of managing a special child indifferent to other specialties which instills a positive attitude towards dentistry as well as total oral health.

Primary Dentition Stage

Establishing the correct dental habits from an early age will help to ensure the health of primary and permanent dentition. Early removal of primary teeth in children with a cleft is particularly contraindicated because of possible space loss, making orthodontic treatment more difficult.^[21]

- The child with a cleft may be sometimes associated with certain syndrome such as Pierre Robin, or have additional medical problems. An understanding of underlined medical problem is necessary to allow for appropriate dental management and treatment planning such as associated middle ear infections and consequent hearing difficulties. Full details concerning the child's prescribed medication. Administration of sucrose-containing medicines can lead to dental caries. Hence, sugar -free alternatives can be preferred.^[22]

As usual the pedodontist is expected to come across certain behavioral problems. A child with a cleft may be shy, nervous, or have behavioral problem. Pedodontist needs patience to establish good communication and rapport which instills a positive dental attitude.^[21]

Pediatric dentist has an important role in helping to balance the child's developing independence with a continuing need for parental help and supervision. Many patients with CLCP experience problems with teasing at school. Psychological counselling is sometimes required

to help the child and support the family. Preventive management mainly involves diet.

- Sugar-containing and acidic should be kept to minimum and should be given at mealtimes only, with the introduction of a training beaker or cup from the age of 6 months
- Weaning foods and drinks should be free from non-milk extrinsic sugars as far as possible
- Babies with a cleft are usually able to cope with a dummy although its use is best deferred until after the palate repair is fully healed. The exception to this is the baby with Pierre

Robin syndrome, where the use of a dummy can help to encourage the sucking reflex.

Parents may be nervous to brush in the region of the cleft, especially following primary lip and palate surgery. Parents should be shown in detail how to brush the teeth and gums properly. It is important to point out the potential problem areas of plaque accumulation around the teeth in the cleft region.

Fluoride also can be used as a part of preventive care. It is essential that carious teeth are restored as early as possible. Radiographic assessment is necessary for thorough treatment planning with regard to caries activity and progression. It is also beneficial to assess growth and development of a child. Pedodontist needs to have an understanding of the surgical procedures and their timing so that dental care can be integrated sensitively within the overall treatment plan.

Mixed Dentition Stage

The increased tendency toward a Class III incisal relationship may become more apparent at this stage. The patient and family are encouraged to focus on the continuing importance of the prevention of dental disease and the maintenance of oral health.

Access to the teeth in the cleft region is often difficult, and a baby-sized toothbrush is still useful even at this age. This can be supplemented with an interdental brush. A 0.2% chlorhexidine gluconate mouthwash is useful for short periods following surgery or to help stabilize gingival health. Fissure sealants & fluoride varnish/mouthwash are an important consideration for this group of patients, wherever indicated. For restoration, Pulp treatment procedures and stainless steel crowns for primary molars should be used where appropriate.^[21]

Interceptive care involves the following,

- A tentative decision on extraction of supernumerary teeth and over retained teeth
- Correction of crossbite
- Expansion of collapsed segment to improve surgical access to the graft site.
- Correction of jaw relationship using facemask therapy in mild maxillary deficient cleft patient.

Permanent Dentition Stage

Marks the beginning of definitive orthodontic treatment. During the teenage years, the patient can lack motivation and find it difficult to visualize the result of the orthodontic treatment.

The pedodontist is in a position to encourage and support the patient in carrying out the appropriate preventive measures and making him aware of the importance of attending both orthodontic and regular dental checkup appointments.^[21]

This stage involves:

- Dietary counseling continues to be of paramount importance
- The patient needs to be made aware of the potential problem of decalcification around the orthodontic brackets and other dental caries problems if the frequency and amount of sugar intake is not controlled

- Acidic foods and beverages need to be regulated to avoid the possibility of erosion.
- Restorations required as a result of caries should be carried out before the start of orthodontic treatment. Adhesive restorative techniques for the remodeling of tooth form, composite or porcelain veneers, and resin-bonded bridges are used to achieve esthetic improvements after the completion of orthodontic treatment. Conventional crowns and bridges or the provision of a partial denture are sometimes necessary.

Conclusion

- The pediatric dentists are one of the constant entities whose role starts from infancy through adolescence. Pedodontists are trained to provide a complete oral rehabilitation as he is well versed in the aspects of behavioral management, child psychology and can thus provide empathetic treatment for the child.
- The role of pedodontist starts from neonatal period right up to permanent dentition phase. The pediatric dentist facilitates the integration of oral hygiene and dental preventive regimens into the treatment protocol for these children to establish desirable habits and oral health before the provision of advanced reparative surgery and complex dental treatment.
- The Pedodontist involvement in the intervention and management of cleft lip and palate children is most important along with the growth of the child. So, its high time for all the pedodontists to get involved and to provide complete rehabilitation to children as every child had the fundamental right to his total oral health and every pedodontist has an obligation to fulfill this faith.

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